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SEED VIABILITY AND SEEDLING VIGOR IN RELATION TO FIELD EMERGENCE OF SOME MAIZE (*Zea mays*, L.,) GENOTYPES

BY

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ABSTRACT

Conducting a combination of some laboratory tests was found to be more promising than a single test to predict field emergence of maize seed. The objective of this study was to find out the relationship between the values obtained from some laboratory tests and that of field emergence of some maize genotypes. Seed samples of 15 seed maize genotypes represented three different groups which are five inbred lines namely Sids 7, Sids 34, Sids 63, Gemmiza 2, Gemmiza 4 and five single cross namely S.C.10, S.C.11, S.C.13, S.C.14 , S.C.15 as well as five three way crosses namely T.W.C.310, T.W.C.311, T.W.C.325, T.W.C.326 and T.W.C.327, were obtained from National Maize Research Program, Agriculture Research Center (ARC) .Laboratory tests were carried out at Seed Technology Research Dept. ARC, field emergence experiments were conducted at 18, 22 and 23 May 2002, 2003 and 2004 , respectively at Qalubia Governorate , to evaluate seed viability and seedling vigor and their relationships to field emergence. The results revealed significant differences within each group in seed and seedling traits under laboratory and field conditions during the three successful seasons. Standard germination, cold test, tetrazolum test and speed of germination were best correlated with field emergence. Whereas accelerated aging, seedling characters, seed weight and seed value insignificant correlated with field emergence .The coefficient of the multiple correlation between laboratory tests, standard germination, cold test, Tetrazolium test, germination speed and that field emergence was also significant. This indicated the importance of conducting some viability and vigor tests in addition to commonly used standard germination to predict field emergence of maize seed.

INTRODUCTION

It is recognized that good seed is the basic and most important input of all crop-based agriculture. It is the least expensive input while other inputs such as fertilizer, pesticides , machinery, labor, ect are all more expensive and sometimes manifold. Furthermore, the return on all of these expensive inputs is directly influenced by the seed planted. It is therefore, good quality seeds can play very important role in increasing productivity of different crops. This especially true for maize crop which is considered one of the most important cereal crops in the world and Egypt, where it widely used in bread making by mixing wheat flour (80%) with maize flour (20%) due to shortage in the amount of wheat produced. The quality of seeds for planting characterized by their viability and vigor, due to several seasons such as genetic make up , harvesting time, processing and storage conditions. On the other hand the value of seed for planting purpose is commercially depending upon the results of the germination test conducted under very favorable conditions in the laboratory. Recently considerable attention has been paid towards vigour tests which could reliably predict stand-potential of seed lots. Tekrony (1982) reported that Vigour testing of seeds in the past twenty years has become a common practice, especially for maize , and the most commonly used vigour tests for maize are the cold test, accelerated aging test and conductivity test (A.O.S.A., 1983); ISTA 1996; Tekrony and Hunter, 1995). However, it is to be noted that seed vigor is highly complex and no one vigour test can be recommended for all crops and therefore a combination of vigour tests may be preferred compared to single test methods (Elemery *et al.*, 1993). Seed viability and vigor directly affect the performance of seed planted to regenerate the crop, although seed quality can influence many aspects of performance (e.g. total emergence, rate of emergence). Reduction in yield can be indirectly related to low seed vigor if plant populations are blew a critical level.(Steiner, 1990; Tekrony and Egli, 1991). Most laboratory test measurements (Standard germination, seedling vigor classification, seedling length and Tetrazolium staining) were significantly correlated with field emergence also these laboratory test measurements were use to develop model predicting field emergence (Robert and Martin1979). Among four seed vigor methods (seedling evolution, seedling growth, and accelerated aging and Tetrazolium test) seedling growth was the reliable method to determine the vigor of sorghum, since both mean plumle length and the amount of normal seedling were significantly correlated with field emergence (Wu and Cheng, 1990). The objective of this study was to find out the relationship between the values obtained from some laboratory tests and that of field emergence of some maize genotypes.

MATERIALS AND METHODS

Seed samples of 15 maize genotypes represented three different groups namely five inbred lines (Sids 7, Sids 34, Sids 63, Gemmiza 2, Gemmiza 4) and five single cross (S.C.10, S.C.11, S.C.13, S.C.14 , S.C.15 as well as five three way cross namely T.W.C.310, T.W.C.311, T.W.C.325, T.W.C.326 and T.W.C.327 were obtained from National Maize Research Program, Agricultural Research Center (ARC), Giza . The sample of each genotype was divided into three portions to be used in three successive planting seasons (2002, 2003, 2004). The portions were stored in a cold room (10 °C , 55-60% RH) in cotton bags until the time of laboratory test and field planting are come up. During laboratory testing period the seeds were stored under the environmental conditions of the laboratory of Seed Technology Research Department, ARC, Giza. For laboratory investigation each seed samples of the three seasons were subjected to the following tests:

Standard germination test(S.G.) and seedling evaluation tests. They were carried out according to the International Seed Testing Association (ISTA, 1987). The seeds were sown in sterilized sand in plastic containers with one hundred seed per container (replicate) and four replicates per seed lot. The seeds were germinated for ten days in an incubator at 25±1 c°. At the end of the incubation period the seedling were losses from sand using tap water then they were cut free from their cotyledons, bulked (10 seedlings of each replicate) and dried at 80 c° in a forced air oven for 24 hours to obtain seedling dry weight (an average of the total weight of 10 seedlings).

Germination speed (G.S.): This test was carried out by following similar procedure of the standard germination test with the exception of the temperature at which the seed were germinated (18-20 C°) and the period of the test (16 days). Daily counts of emerged seedlings were recorded and vigour index was calculated according to (Kotowski 1926).

$$C.G = \frac{100\,(A1 + A2 + \text{--------} + Ax)}{A1T1 + A2T2 + \text{-------} AxT\infty}$$

Where C.G= Coefficient of germination

A= number of seeds germinating

T= time corresponding to A

∞= number of days to final account

Cold soil test (C.T): in this test, a screened non-sterile mixture of sand and field soil in the ratio of 1:1 was used. The moisture content and the water-holding capacity of the mixture were calculated to determine the actual amount of water needed to adjust the mixture moisture to 60%water holding capacity. 100 seeds replicated four times were placed on top of 5 cm wall leveled soil-sand mixture and covered with an additional 5 cm compacted soil-sand mixture . Containers were incubated at 10 ± 1 C° for two weeks after which they were transfer to an incubator at 25± 1 C°. The number of normal emerged seedlings were counted and expressed as cold germination percentage.

Electrical conductivity (E.C.): This test is based on the principle that seeds which are losing vigour release materials such as sugars or other electrolytes out the seed into the soil which may increase the activity of soil fungi which may interfere with the development of seedling growth especially under clod and wet soil conditions. This test was undertaken with four 50 seeds each for each sample. The seeds were weighted and soaked in 100 ml of distilled water for 24 h at 25±1 C° . The conductivity of seed steep water was measured immediately after the removal of samples from the incubator, using a conductivity meter and reported as µ mhos/gm seeds.

Tetrazolium test (T.Z.): 4x100 seeds of each sample were soaked in water for 20 hours at room temperature. Then, the seeds were cut with a sharp blade in such a way that the whole embryo of each seed was existed without any mechanical damage. Fragments of the cotyledon and test attached to the embryo were removed. The embryos were immersed in 0.5% solution of 2, 3, 5 triphenyl tetrazolium chloride in dark in the incubator. Later the embryos were rinsed with water and transferred in Petri dish containing water to avoid drying seed. Completely –staining embryos of each replicate were calculated through magnifying lens (5x) under fluorescent light.

Seed value (S.V.) and seed weight tests (S.W.): The value of 100 seeds of each sample was measured by displacement of water and the 1000 seeds weight was also determined according to the procedures outlined by the International Seed Testing Association (ISTA, 1999).

Field emergence experiments(F.E.): A randomize complete design with four replication of 100 seeds was utilized for each of the three seasons at Qalubia Governorate. The seeds were planting on may 18, 22, 23, respectively. Seedling emergence in each season was made at time intervals until constant and the highest figure was used . All data were subjected to the standard analysis of variance procedures outlined by Steel and Torrie (1980). Simple correlation coefficient were calculated to compare the association between values resulted from the standard germination and vigour tests as well as seedling emergence .The partial regression and multiple regression techniques outlined by Pindyck and Rubinfeld (1981) were also utilized in order to obtain more accurate estimation for the relationship between laboratory tests and field emergence of some maize genotypes.

RESULTS AND DISCUSSION

Data in Table (1) show that significant differences seed and seedling traits were observed amongst the tested maize inbred lines under varying testing conditions of the laboratory during the three successive seasons (2002-2004).The standard germination % ranged from 93 to 88.2, 88.2 to 82.4 and 86.5 to 78.4 in the three successive seasons, respectively. Gemmiza 4 inbred line was the highest germination (93%), while sids63 inbred line was the lowest one (88.2) in the first season, also Gemmiza2 inbred line was the highest germination (88.2, 86.5%) in the second and the third seasons while Sids 34 (82.4) and sids63 (78.4) inbred lines were the lowest one. The decline in seed germination during storage might be due to the genetic makeup , cultural practices and processing. These factors have a tremendous effect of seed storability as reported by Burris (1977).There were significant declines in germination after the cold test and accelerated ageing of maize inbred lines. The cold test ranged from 72.1 to 68.3, 70.8 to 65.7 and 69.1 to 61.5 in the three successive seasons, respectively. The inbred line Sids 7 more tolerant to cold test conditions (72.1, 70.8 and 69.1 , respectively) compared with other inbred lines in the three successive seasons. The accelerated ageing germination of maize inbred lines was ranged from 81.2 to 72.3, 79.4 to 69.9 and 74.8 to 66.5 in the three successive seasons, respectively. The tested maize inbred lines were significantly differences in their germination after the accelerated ageing due to differences in their genetically make up to tolerant adverse conditions of the cold test.

Data in Table (1) show the staining percentage of the embryos with Tetrazolium solution was too closed to those of standard germination .This may relieve that the Tetrazolium test was reliable and quick approach for quality evaluating of maize inbred lines. Elemery and Elrabie (1996) suggested that the possibility of using the Tetrazolium test for quick evaluation of faba bean seed viability, where the result can be obtained after 24 hours compared with 14 days for germination test. The electrical conductivity of different maize inbred lines ranged from 12.2 to 11.8, 13.8 to 12.5 and 14.9 to 13.3 (μ mhos/g) in the three successful seasons, respectively. The inbred lines Gemmiza 4, Sids 63 and Gemmiza 2 were the lowest values in their electrical conductivity the three successive seasons, respectively.

Seedling vigor characteristics as measured by seedling radical length, plumle length and seedling dry weight (Table 1) was directly effected by maize inbred lines. Sids 34 seed produced seedlings which had a greater root length (12 cm) and dry weight (15.2 g) , while gem 4 had a greater shoot length (20cm) in the first season. Seedlings characters had similar trend in the other two seasons.

The speed of germination of Sids 7 was the faster amongst maize inbred lines, while Gemmiza 4 inbred line was the lowest one in the three successive seasons. The seed value ranged from 840.6 to 730.1, 831.9 to 723.4 and 825.1 to 718.5 in the three seasons, respectively. The Gemmiza 4 inbred line was the highest seed value, while Gemmiza2 inbred line was the lowest one (88.2) in the three successive seasons. On the other hand, the highest mean value of 100-seed weight was detected by Sids7 inbred line while the lowest one detected by Gemmiza2, Gemmiza4 and Sids63 in the three successful seasons.

The field emergence percentage ranged from 72.1 to 69.5, 71.3 to 64.5 and 61.1 to 52.5 in the three successive seasons. Sids7 inbred line had the highest field emergence, while Sids 34 inbred line was the lowest one. The relative field emergence (denotes to the percentage of viable seed produced plants in the field / seed germination as determined in the laboratory) was ranged between 79.0 to 75.8, 83.2 to 74.0, 74.4 to 63.9 in the three successive seasons.

Tables (2 and 3) show the data of various laboratory tests and field emergence It is obvious that single crosses and three way crosses had higher germination values under favorable(standard germination) and stress conditions (cold test, accelerated aging test) than those of inbred line. This might explain by hybridization effect on seed viability and agreed with the statement reported by (Mock and McNeil, 1979 ; Chen and Lin, 1982) where they found that hybrids maize have faster and higher percentage of germination than inbred lines. But , no clear explanation could be found for differences between single and three way crosses.

Tables (2 and 3) show also that the results of Tetrazolium , electrical conductivity, seed value , seed weight tests have similar trend to those obtained in Table (1). Seedling characters , field emergence and relative field emergence were influenced by genetic make up where single and tri-crosses seeds were capable of producing vigorous seedlings and better field emergence compared to those produced from inbred lines seeds.

Table (1): Seed vigour tests of various maize inbred lines during three successful seasons (2002-2004).

Traits	2002					L.S.D.0.05
	Sids7	Sids34	Sids63	Gem.2	Gem.4	
S.G. (%)	91.2	89.1	88.2	92.1	93.0	0.721
C.T. (%)	72.1	70.4	68.3	70.6	71.1	0.253
A.A. (%)	73.2	72.3	81.2	72.9	77.1	0.279
TZ. (%)	90.3	91.6	88.1	93.0	94.0	0.446
EC. (μ mhos/g)	12.1	12.2	11.9	12.1	11.8	0.212
S.R.L. (cm)	9.3	12.0	8.2	9.9	10.3	0.304
S.P.L. (cm)	16.0	17.2	15.4	19.0	20.0	1.764
S.D.W. (mg)	12.5	15.2	11.9	14.0	14.8	1.265
G.S.(%)	49.2	40.3	38.5	32.7	32.3	0.296
S.V. (g/L)	780.3	776.5	748.0	730.1	840.6	1.272
100-S.W. (g)	28.9	29.2	27.9	27.1	28.4	0.367
F.E (%)	72.1	69.5	68.9	70.2	70.5	0.218
R.F. (%)	79.0	78.0	78.1	76.2	75.8	4.713
	2003					
S.G. (%)	85.6	82.4	84.5	88.2	86.1	0.842
C.T. (%)	70.8	68.4	65.7	69.3	70.2	0.618
A.A. (%)	72.3	71.5	79.4	69.9	75.2	0.402
TZ. (%)	89.1	87.9	86.0	90.2	90.0	0.777
EC. (μ mhos/g)	12.9	13.8	12.5	12.9	12.9	0.300
S.R.L. (cm)	9.1	11.5	8.1	9.6	9.8	0.195
S.P.L. (cm)	15.8	17.0	15.3	17.6	18.4	1.345
S.D.W. (mg)	12.4	15.0	11.6	13.7	14.4	1.312
G.S.(%)	45.2	35.8	34.9	30.7	28.6	0.374
S.V. (g/L)	776.5	771.2	736.2	723.4	831.9	0.330
100-S.W. (g)	28.8	26.2	27.7	26.9	24.7	0.450
F.E (%)	71.3	66.7	64.5	65.3	65.5	2.062
R.F. (%)	83.2	80.9	76.3	74.0	76.1	0.212
	2004					
S.G. (%)	82.1	78.8	78.4	86.5	79.3	1.191
C.T. (%)	69.1	66.6	63.7	61.5	64.3	0.229
A.A. (%)	70.9	70.1	74.4	66.5	74.8	0.234
TZ. (%)	87.8	86.3	86.7	87.0	87.6	0.233
EC. (μ mhos/g)	13.4	14.6	14.9	13.3	13.9	0.377
S.R.L. (cm)	9.0	7.6	7.9	9.1	8.9	0.271
S.P.L. (cm)	15.7	16.8	15.0	17.2	18.0	1.587
S.D.W. (mg)	12.2	14.8	11.3	13.6	14.1	0.312
G.S.(%)	43.3	33.9	33..3	31.6	25.9	0.472
S.V. (g/L)	769.3	766.7	729.4	718.5	825.1	0.304
100-S.W. (g)	28.0	22.8	26.0	27.4	26.8	0.452
F.E (%)	61.1	52.5	58.4	55.3	52.9	0.253
R.F. (%)	74.4	66.6	74.4	63.9	66.7	0.330

Table (2): Seed vigour tests of various maize single cross during three successful seasons (2002-2004).

Traits	2002					L.S.D.0.05
	S.C.10	S.C.11	S.C.13	S.C.14	S.C.15	
S.G. (%)	94.5	96.7	96.1	95.3	97.1	0.393
C.T. (%)	78.2	80.1	80.4	77.5	75.3	0.239
A.A. (%)	79.3	76.2	86.3	77.2	88.1	0.176
TZ. (%)	91.1	92.3	95.0	94.2	97.1	1.802
EC. (µ mhos/g)	12.1	10.3	9.9	13.2	10.1	0.244
S.R.L. (cm)	12.8	14.6	10.4	11.1	12.5	0.365
S.P.L. (cm)	20.8	22.4	21.5	20.9	21.7	0.234
S.D.W. (mg)	13.6	14.9	10.4	15.1	11.6	0.276
G.S.(%)	55.2	54.6	58.2	53.2	55.1	0.189
S.V. (g/L)	756.1	741.2	751.3	760.4	735.3	0.195
100-S.W. (g)	31.4	30.0	27.1	28.8	29.1	1.124
F.E (%)	76.1	77.2	76.6	76.2	78.7	0.296
R.F. (%)	80.5	79.8	79.7	79.9	81.0	1.276
	2003					
S.G. (%)	90.7	91.3	92.2	90.7	85.7	0.119
C.T. (%)	74.2	76.7	77.8	79.3	72.1	0.351
A.A. (%)	78.3	74.5	85.7	76.3	80.2	0.212
TZ. (%)	90.7	92.1	93.9	92.0	95.2	1.262
EC. (µ mhos/g)	13.3	13.4	14.3	16.2	14.7	0.258
S.R.L. (cm)	12.6	14.4	10.3	10.9	12.3	0.276
S.P.L. (cm)	20.6	22.1	21.3	20.6	21.4	0.288
S.D.W. (mg)	13.3	14.8	10.1	15.0	11.5	0.758
G.S.(%)	50.9	51.9	54.3	53.8	52.9	0.256
S.V. (g/L)	751.6	732.8	746.3	753.4	726.6	0.201
100-S.W. (g)	31.2	29.6	26.8	28.4	28.8	0.591
F.E (%)	76.1	76.2	79.7	70.1	70.5	0.162
R.F. (%)	83.9	83.5	86.4	77.3	82.3	0.292
	2004					
S.G. (%)	85.2	87.0	86.1	86.0	83.1	0.399
C.T. (%)	64.5	64.3	73.8	67.1	76.3	0.229
A.A. (%)	75.7	73.1	83.4	73.0	78.1	1.231
TZ. (%)	88.7	91.0	90.0	89.1	91.0	1.018
EC. (µ mhos/g)	15.9	13.8	15.5	16.3	14.8	0.253
S.R.L. (cm)	12.2	14.3	10.2	10.8	12.2	0.292
S.P.L. (cm)	20.3	21.9	21.1	20.5	21.0	0.207
S.D.W. (mg)	13.1	14.5	10.0	14.7	11.2	1.724
G.S.(%)	48.4	50.3	49.3	52.8	47.7	0.284
S.V. (g/L)	746.2	724.5	739.1	744.3	720.9	0.271
100-S.W. (g)	30.8	29.5	26.7	28.3	28.6	0.271
F.E (%)	70.2	69.3	67.1	65.1	68.1	1.067
R.F. (%)	82.4	79.7	77.9	75.7	81.9	0.288

Table (3): Seed vigour tests of various maize three way cross during three successful seasons (2002-2004).

Traits	T.w.c.310	T.w.c.311	T.w.c.325	T.w.c.326	T.w.c.327	L.S.D.0.05
	2002					
S.G. (%)	95.3	91.4	96.2	92.4	91.3	0.182
C.T. (%)	81.2	80.4	83.1	84.5	80.3	0.223
A.A. (%)	75.4	74.3	72.1	75.6	71.6	0.304
TZ. (%)	93.1	90.2	92.2	91.4	89.3	0.223
EC. (µ mhos/g)	12.1	12.2	11.9	12.1	11.2	0.189
S.R.L. (cm)	13.6	14.1	13.2	13.5	14.2	0.218
S.P.L. (cm)	21.1	22.8	21.9	22.1	23.6	2.750
S.D.W. (mg)	14.1	15.6	12.4	14.2	14.8	0.334
G.S.(%)	58.2	59.2	55.1	58.5	60.2	0.207
S.V. (g/L)	760.4	786.6	761.1	841.2	831.6	0.244
100-S.W. (g)	35.9	31.8	39.8	26.2	29.9	0.229
F.E (%)	79.2	76.2	82.1	75.1	79.1	0.154
R.F. (%)	83.1	83.4	85.3	81.3	86.6	0.218
	2003					
S.G. (%)	92.5	88.6	92.4	87.3	86.1	0.195
C.T. (%)	77.2	73.4	74.5	72.1	72.3	0.239
A.A. (%)	72.1	70.1	69.3	74.3	71.4	0.218
TZ. (%)	90.2	87.3	88.4	85.1	85.5	0.212
EC. (µ mhos/g)	12.6	12.8	12.2	12.3	11.5	0.284
S.R.L. (cm)	13.5	13.6	13.1	13.1	13.8	0.248
S.P.L. (cm)	20.9	22.7	20.9	22.0	23.4	1.298
S.D.W. (mg)	13.2	15.1	12.2	14.0	14.2	1.255
G.S.(%)	57.5	56.8	56.2	58.5	58.5	0.244
S.V. (g/L)	756.4	775.3	756.1	833.1	823.4	0.212
100-S.W. (g)	35.7	31.6	39.2	26.1	29.2	0.296
F.E (%)	76.5	75.8	80.1	77.1	75.3	0.284
R.F. (%)	82.7	85.6	86.7	88.3	87.5	0.365
	2004					
S.G. (%)	85.5	81.4	82.3	81.2	80.1	0.267
C.T. (%)	72.6	70.7	68.1	68.5	68.3	0.267
A.A. (%)	71.1	70.3	68.4	69.7	70.2	0.239
TZ. (%)	82.3	80.2	78.3	76.5	78.3	0.229
EC. (µ mhos/g)	13.1	13.3	12.6	12.6	11.9	0.248
S.R.L. (cm)	13.3	13.5	12.8	12.8	13.1	0.308
S.P.L. (cm)	20.8	22.3	20.1	21.5	22.6	0.292
S.D.W. (mg)	13.1	14.9	12.0	13.8	14.1	1.251
G.S.(%)	50.2	51.6	51.6	55.3	56.1	0.271
S.V. (g/L)	739.4	763.3	749.2	827.5	820.8	0.304
100-S.W. (g)	34.9	31.2	37.1	25.9	27.2	0.176
F.E (%)	70.2	69.6	72.3	72.1	70.1	0.288
R.F. (%)	82.1	85.5	87.8	88.8	87.5	0.495

Simple correlation coefficient between laboratory tests and field emergence of some maize genotypes are presented in Table (4). The standard germination, cold test, tetrazolum test and speed of germination were positively and significantly correlated with field emergence. The electrical conductivity, accelerated ageing germination , Seedling vigor characteristics (seedling radical, plumle length and seedling dry weight), seed value and 100-seed weight of different maize genotypes were insignificant correlation with field emergence. These results might indicate that selection for high values of standard germination, cold test, tetrazolum test and speed of germination as well as selection for low values of electrical conductivity are more effective for precise prediction of field emergence. The multiple correlation coefficient for the relationship between these strongest explanatory variables and field emergence was also significant (R = 0.92, 0.89 , 0.96 for inbred lines , single and tri- crosses, respectively, Table 5).however, taking into account the economic considerations , the costs of conducting five laboratory tests is more expensive than one or two supplementary tests in addition to standard germination to adjustment seeding rate and predict field emergence .the results in (Table 5) provide several alternative combinations which can be applied with lower costs according to the available facilities. The application of these methods leads more accurate and reliable of field emergence.

Table (4): Correlation coefficient of different laboratory measures of maize genotypes with field emergence.

Traits	Inbred line	Single cross	Three way cross
S.G.	0.783^{**}	0.851^{**}	0.883^{**}
C.T	0.828^{**}	0.605^{*}	0.665^{**}
A.A.	0.346^{ns}	0.483^{ns}	0.383^{ns}
TZ	0.685^{**}	0.627^{*}	0.822^{**}
EC	-0.796^{**}	-0.749^{**}	-0.563^{*}
SRL	0.503^{ns}	0.183^{ns}	0.288^{ns}
SPL	0.108^{ns}	0.410^{ns}	0.091^{ns}
SDW	-0.035^{ns}	-0.064^{ns}	0.159^{ns}
SG	0.522^{*}	0.614^{*}	0.585^{*}
SV	0.108^{ns}	0.363^{ns}	0.023^{ns}
100-S.W.	0.190^{ns}	0.157^{ns}	0.420^{ns}

Table (5): The estimated results for the relationship between selecting laboratory measures of maize genotypes and field emergence.

Source of correlation	Inbred line	Single cross	Three way cross
SG*CT	0.89	0.85	0.91
SG*TZ	0.78	0.86	0.90
SG*EC	0.81	0.86	0.92
SG*GS	0.86	0.86	0.89
CT*TZ	0.84	0.71	0.84
CT*EC	0.90	0.79	0.76
CT*GS	0.84	0.68	0.74
TZ*EC	0.82	0.78	0.86
TZ*GS	0.84	0.72	0.83
EC*GS	0.85	0.79	0.62
SG*CT*TZ	0.91	0.87	0.92
SG*CT*EC	0.90	0.86	0.96
SG*CT*GS	0.91	0.87	0.93
SG*TZ*EC	0.82	0.86	0.94
SG*TZ*GS	0.87	0.88	0.93
SG*EC*GS	0.87	0.87	0.92
CT*TZ*GS	0.91	0.80	0.76
CT*EC*GS	0.87	0.73	0.84
CT*TZ*EC	0.89	0.78	0.86
TZ*EC*GS	0.90	0.81	0.88
SG*CT*TZ*EC*GS	0.92	0.89	0.96

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العلاقة بين حيوية التقاوى وقوة انبات البادرات والأنبات الحقلى فى بعض التراكيب الوراثية من الذرة الشامية

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تهدف هذه الدراسة الى دراسة العلاقة بين النتائج المتحصل عليها من بعض الاختبارات المعملية التى تجرى على التقاوى لتقييم حيويتها وقوة انباتها بالنتائج المتحصل عليها تحت ظروف الحقل . الاختبارات المعملية هى: وزن ١٠٠ بذرة ، وزن حجم معين من الحبوب ، الانبات تحت الظروف المثلى ، سرعة الانبات ، الاختبار البارد ، اختبار الشيخوخة ، اختبار التوصيل الكهربى ، اختبار التترازوليم ، تقييم صفات البادرات (طول الجذير– طول الريشة– الوزن الجاف للبادرات) . اشتملت التجارب الحقلية خلال مواسم ٢٠٠٢، ٢٠٠٣ ، ٢٠٠٤ على تقدير نسبة الانبات تحت ظروف الحقل. كما أشتملت الدراسة على ١٥ تركيب وراثى من الذرة الشامية(٣ مجموعات × ٥ تراكيب وراثية) ، وهى:خمسة سلالات نقية (جميزة٢– جميزة ٤– سدس ٧– سدس٣٤ – سدس٦٣) ، خمس هجن فردية (هجين فردى ١٠، ١١، ١٣،١٤، ١٥) ، خمس هجن ثلاثية (هجين ثلاثى ٣١٠ ، ٣١١ ، ٣٢٥، ٣٢٦ ،

٣٢٧). أوضحت النتائج وجود اختلافات معنوية داخل كل مجموعة فى حيوية التقاوى وقوة انبات البادرات عند اجراء الاختبارات المعملية الآتية (الانبات وسرعة الانبات والاختبار البارد ، التترازوليم و التوصيل الكهربى) ، فى حين لم تكن هناك اختلافات معنوية فى حيوية التقاوى وقوة انبات البادرات عند اجراء الاختبارات التالية (اختبار الشيخوخة ، تقييم صفات البادرات من حيث طول الجذير طول الريشة الوزن الجاف للبادرات ، وزن ١٠٠ بذرة ، وزن حجم معين من الحبوب) . كما اوضحت النتائج وجود ارتباط معنوى داخل كل مجموعة بين انبات الحقل وكل من انبات المعمل والاختبار البارد وسرعة الانبات والتترازوليم والتوصيل الكهربى.فى حين ان الارتباط كان غير معنويا بين انبات الحقل وقيم اختبارات اختبار الشيخوخة ، صفات البادرات ، وزن ١٠٠ بذرة ، وزن حجم معين من الحبوب.وعند تطبيق نموذج الانحدار المتعدد بين الاختبارات المعنوية (الانبات ، الاختبار البارد ، اختبار التترازوليم ، سرعة الانبات والتوصيل الكهربى) وجد ان اجراء مثل هذه الاختبارات معا او بعضا منها لتقييم حيوية قبل الزراعة أكثر فاعلية فى التنبؤ بالانبات الحقلى وتقدير معدل التقاوى من الاعتماد على نتائج الاختبارات كل على حدة.